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Observations on the relationship between the Dietetic Objective Structured Clinical Exam and placement outcome.

Abstract

Aims

Objective Structured Clinical Examinations (OSCEs) are used extensively in medical education to prepare students for the clinical setting. Use in dietetic education is still relatively new and relationships to placement outcomes are unknown. The aim of this review was to explore eleven years of OSCE and placement data to answer: Does the OSCE predict dietetic placement outcome? and What are the student perceptions of the benefits of OSCE in preparation for practice?

Methods

Data collected retrospectively from 328 students between 2006-2017 who had completed their final year OSCE and placement. Aggregate OSCE mark and mean marks obtained in active and passive OSCE stations, were compared to placement outcome. Evaluation questionnaires completed by students at the end of the OSCE were collated.

Results

Aggregate marks achieved in OSCE stations were significantly different in students who passed (mean 63.24, SD7.94), struggled (mean = 58.25, SD8.82) or failed (mean = 57.31, SD8.28) placement, $p < 0.001$. Majority of students perceived the OSCE as a meaningful and fair assessment (92%) that helped to prepare them for practice (82%).

Conclusions

The OSCE provides a meaningful assessment of dietetic student skills in preparation for practice. Aggregate OSCE marks provide a consistent indicator of students who are likely to struggle in practice.

Key words: Assessment, competence, dietetics, education, evaluation, OSCE

Introduction

Medical education has utilised **Objective Structured Clinical Exams (OSCEs)** for many years to develop communication and clinical skills ¹ in preparation for the clinical setting. ²⁻³ **OSCEs** are reported to stimulate learning and greater achievement of specific clinical competence.⁴ It is well documented that the OSCE is labour intensive, time consuming and therefore an expensive examination to run ⁵ however, the ability to prepare students for the practice setting has been identified as a key strength of this examination ² as well as its flexibility in design and structure.⁶

There is a wealth of data supporting the use of the OSCE to prepare medical students for practice,⁷ in contrast, OSCE assessments in dietetics is relatively new.⁸ Consequently, there is little reported data on whether the OSCE has the same benefits in preparing dietetic students for placement.⁸ In addition, the range of skills assessed in a dietetic OSCE may differ from those assessed in medical, nursing and other professional **OSCEs**.^{4, 7-8} Although communication skills **are** core to all professional assessments, remaining skills tested will vary due to the nature of the work undertaken by the different professions. For example: dietetic students may be assessed on

anthropometric assessments, but hands on examination, use of equipment or clinical procedures as seen in nursing, medical **OSCEs** is not required.

The design of the dietetic OSCE involves mapping of specific skills against the examination format as described by others.⁹⁻¹¹ The OSCE was originally set up as six discrete 10- minute stations, consisting of two active and four passive stations¹⁰ using a multi- station design¹² to test specific clinical skills. Active stations focus on communication skills, knowledge and application whilst passive stations explore practical skills around knowledge application, understanding and dietary manipulation.¹¹

Actors using standardised scripts play the part of patients in the active OSCE stations¹³. Experienced academic or clinical examiners assess active stations using a standardised scoring sheet, which assesses the knowledge and communication skills utilised by students. Actors and examiners meet prior to the examination to run through the scripts, discuss standard answers and clarify scoring to ensure consistency during the examination. In addition, moderation occurs at the active stations to ensure consistency with actor's delivery throughout the examination and marking process.

The passive stations assess clinical skills such as assessment, implementation and intervention. For example, a clinical scenario and data for planning a dietetic intervention, such as biochemistry, growth charts and food diaries maybe provided. Allowing assessment of student's ability to interpret provided data; identify areas in the diet requiring manipulation, addressing issues raised, as well as indicating appropriate alternative food choices. Skills required to carry out these tasks are developed and

practiced in class helping to prepare students for both the OSCE examination and the final practice.¹⁴

Students move from station to station, a system of bells and buzzers indicates when the student should move to the next station. Incorporation of feedback from examiners, students and actors¹⁰ over the years has resulted in a number of changes. Key skills tested from the initial OSCE design of six 10- minute stations were amalgamated into four 15- minute stations, which included two passive and two active stations.

Integration of skills into longer OSCE stations more accurately reflect a real life scenario.¹⁴ For example, having more time in the active station with the actors allows students time to move through the Model and Process for Nutrition and Dietetic Practice (**MPNDP**),¹⁵ as they would in a real clinical situation, rather than focusing on one discrete aspect of the consultation. In addition, integration of skills better reflects the growing competency and skill development of a final year student¹⁶ and allows better assessment of communication and clinical reasoning skills.¹⁷⁻¹⁸ Examiners test clinical reasoning skills further at the end of the active station by asking a standard question.

Placement assessment requires students to demonstrate competencies in the following areas: the **MPNDP**,¹⁵ communication, reflection, professionalism and time management. The OSCE examination therefore specifically tests skills related to the **MPNDP**,¹⁵ communication, professionalism and time management in preparation for placement.

The use of the OSCE with Australian and UK dietetic students prior to their first practice experience has indicated a potential for the OSCE to predict those students who may have difficulties on their initial placement.⁸ However, first placements or early

placements are likely to be the most challenging for students as experiences in these settings will all be new, including opportunities for students to start working with patients and applying theory into practice. Student performance on final year placement and final year OSCE however may differ considerably, as students will have a greater knowledge base, prior placement experience and opportunities to practice and develop skills further.

This paper reports on data collected over the last 11 years and will review final year OSCE marks and the relationship to dietetic students' progress on final year placements. It includes an exploration of the relationship between active and passive station marks, student outcome on the final placement and student's perception of this examination.

Methods

Ethical approval was provided by the Faculty Research Ethics and Integrity

Committee. Data was collected retrospectively on students from 2006 to 2017, who had completed both the final year OSCE and undertaken the final placement. OSCE marks and placement outcome were collated. Student feedback following the OSCE was collated onto an excel spreadsheet. Feedback from students following OSCE is a standard process; with anonymous feedback from student's actors and examiners, being used annually to modify OSCE design and delivery. Feedback is collated at the end of the OSCE; it includes questions that explore perception of the OSCE. Questionnaire responses range from strongly agree, agree, neither disagree nor agree, disagree, strongly disagree. Percentage responses were collated for agreement and disagreement, responses coded as; neither agree nor disagree, where coded as disagreement. Achievement on placement was split into three categories:

1. Pass, achieved all placement learning outcomes.

2. Struggled, required additional support from placement team before passing placement.

Data on students requiring extra time and/or support from placement team is routinely recorded at the time of placement and was used to code students in this category.

3. Failed, did not achieve placement learning outcomes despite additional support from placement team.

Active stations link into placement competencies around communication, and application of the MPNDP ¹⁵ and professionalism. Students may receive a food record and GP letter to review before starting the consultation. Information gathered during the consultation guides assessment, diagnosis and appropriate provision of information to the actor in a professional and competent manner.

Passive stations link into placement competencies relating to the MPNDP ¹⁵ and involve discriminatory skills, interpretation of data and practical application of food knowledge skills. Active and passive stations are both time limited linking into the placement competency around time management.

In 2010 following programme redesign, the timing of the OSCE changed from a post to a pre-placement assessment, and the number of OSCE stations were reduced to four 15-minute stations (two active and two passive). Data from 2006/7 to 2009/10 relates to the OSCE being undertaken after placement and data from 2010/11 to 2016/17 relates to the OSCE being undertaken prior to clinical placement.

OSCE station marks are reported as percentages. Descriptive statistics are provided for the aggregate OSCE mark, and the mean active and mean passive station marks from 2006-2017. Student feedback was explored using percentage response to evaluations. Inferential statistics were carried out using SPSS, version 21 (SPSS Inc, Chicago, IL, USA). Data were tested for normality using the Shapiro-Wilk's test.

Differences in OSCE active and passive station marks and placement outcome were explored using one way ANOVA and independent t-test. The level of significance was set at $p < 0.05$.

Results

A total of 328 students undertook the OSCE from 2006-2017. The aggregate score achieved for the OSCE was 62.42 % (SD 8.29).

One way ANOVA indicates significant differences in the aggregate OSCE mark for students who passed, struggled or failed placement $F = (2, 325) = 9.842, p < 0.001$ (see Table 1).

INSERT TABLE 1 HERE

Table 1: Aggregate marks achieved in OSCE and placement outcome

The difference in aggregate OSCE mark for students who struggled and students who failed placement was not significant. Of those students identified as requiring additional support from the placement team ($n = 22+26$), nearly half 46% (22/48) went on to achieve the final placement.

Data was reviewed to explore timing of the OSCE (pre-placement and post-placement), and impact on relationship between aggregate OSCE mark and placement outcome. Regardless of OSCE timing, aggregate OSCE mark for students who passed placement and those who failed placement remains significantly different (Table 2).

INSERT TABLE 2 HERE

Table 2: Aggregate OSCE mark for Post-Placement and Pre -placement compared to placement outcome

Data for active station OSCE marks and placement outcome were explored for pre and post-placement timings. There were 2 years when the post-placement OSCE ran with only 1 active station, 2008/9 and 2009/10. Data for these two years was removed to allow comparison of mean active station marks and placement outcome, see Table 3.

INSERT TABLE 3 HERE

Table 3: Mean active station marks and placement outcome

Regardless of post and pre-placement OSCE timing, mean active station mark for students who passed placement and those who failed placement remains significantly different.

How many students failing active stations go onto fail placement? Regardless of post and pre-placement OSCE timing the percentage of student's failing one active station is consistent, post-placement was 9% (6/65) and pre-placement was 10% (19/190). Of those students failing one active station, 64% (16/25) went on to pass the placement.

Data for passive station OSCE marks and placement outcome were explored for pre and post-placement timings. Pre-placement OSCE; there was no significant difference in

passive station marks achieved by students who, passed, struggled or failed placement,
see Table 4.

INSERT TABLE 4 HERE

Table 4: Mean passive station marks and placement outcome

A total of 312 students completed the evaluation questionnaires equating to a 95%
(312/328) response rate. The data were separated into two categories, students
completing the OSCE after placement and students completing OSCE before placement,
see Table 5.

INSERT TABLE 5 HERE

Table 5: Student evaluation of the OSCE examination

Undertaking the OSCE pre-placement as compared to post- placement resulted in higher
agreement with all questions. Students perceived the OSCE to be stressful regardless of
timing however, the last three years indicates a downward trend in students perceived
level of stress with responses of 97%, 83% and 70% being recorded.

Discussion

This retrospective review of final year OSCE and placement data has identified a
significant difference in the aggregate OSCE mark and placement outcome. The mean
active station mark was significantly different in students who passed, and students who
failed placement however, the passive station marks lost significance with placement
outcome when the OSCE moved to a pre-placement assessment. Student evaluation
supported the view that the OSCE is a meaningful and fair assessment of skills, which

prepare students for practice. The data presented here is unique in that it provides a longitudinal perspective that illustrates a consistent relationship between dietetic students' performance in the OSCE and dietetic placement outcome. This data supports and builds on findings from other studies. Highlighting the potential of the dietetic OSCE to identify dietetic students who may require additional support on placement.⁹ In addition, findings indicate that the OSCE not only has a place in identifying first year dietetic students who may struggle on placement⁹ but also final year dietetic students completing the final placement.

Although the timing of the OSCE has changed, from post to pre-placement, relationship between OSCE performance and placement outcome remains significant. The OSCE comprises of active and passive stations, the mean active station marks were a significant indicator of students' achievement on placement and provides further evidence to support this type of examination to test the application of knowledge and communication skills prior to placement. A small number of dietetic students (10%) regularly fail one of the active stations, failing one active station is not indicative of failing placement. Obtaining a lower mean mark in the active stations is however, linked to placement failure, suggesting a more generalised problem with applying communication skills and knowledge to support clinical reasoning skills.

Performance at active stations was variable with large deviations in the marks achieved. Knowledge and confidence¹⁹ may inhibit performance resulting in poor demonstration of communication skills. When knowledge and confidence are high, better communication skills maybe demonstrated, communication skills and knowledge are

224 closely linked ²⁰ resulting in case based variability of students' ability to communicate
225 to actors in **OSCEs**. ²¹ This may account for the variability seen in active station marks
226 in the dietetic OSCE.

227
228 In addition, medical **OSCEs** that assess whole tasks, where students examine patients
229 on a diagnosed complaint rather than discrete skills, increased students' use of
230 diagnostic reasoning skills. ¹⁷ This may also be the case for the dietetic active OSCE
231 stations, with the move from discrete skill testing, to longer consultations that reflect
232 real life scenarios. ²² On placement, students need to demonstrate their ability to apply
233 clinical reasoning skills, to work through the MPNDP ¹⁵ with a variety of patients. Lack
234 of ability to transfer these skills from one patient to another, to demonstrate safe clinical
235 reasoning will result in placement failure. Lower mean marks achieved in the active
236 stations are therefore indicative of poor clinical reasoning skills.

237
238 Passive stations test skills against paper exercises, actors are not involved. Passive
239 station marks lost significance with placement outcome when the OSCE moved to a
240 pre-placement assessment. Completing the OSCE post-placement allows students time
241 to practice and consolidate skills on placement. The significant association between
242 placement outcome and passive station marks post-placement may therefore reflect poor
243 consolidation of these skills on placement. Alternatively, anxiety of undertaking the
244 practical exam following a failed placement may result in poor performance at passive
245 stations. When passive stations occur prior to placement, attainment of skills are more
246 likely to reflect students learning and acquisition of skills in University. This may
247 account for the lack of significance between placement outcome and passive station

marks when the OSCE moved from post to pre-placement assessment. In addition, the resulting lack of significance between placement outcome and passive station marks suggests that skills examined are different from those in active stations. Passive stations test a discrete range of skills, patients are not involved, this may contribute to the lack of association between pre-placement passive station marks and placement outcome, as complex clinical reasoning skills are not specifically tested.¹⁷

Moving the OSCE to pre-placement has altered students' perception of the relevance of this examination, with the majority of students reporting the OSCE to be a more meaningful and fair assessment of skills. Students increasingly see this examination as a way to help them manage stressful events. Similar to findings in dental students,²³ the majority of dietetic students indicated that they found the OSCE stressful.

Interestingly, perceived stress in dental students did not affect student performance.²³

Hong²⁴ however has suggested that student's anxiety about **OSCEs** may influence their ability to perform during the OSCE. Examination stress may affect their

individual working memory "*the ability to hold in information and manipulate it*"²⁵

(p93) the combined effect of this could result in a poor demonstration of skills within the active OSCE stations. In nursing students, anxiety has been reduced by providing video exemplars prior to the OSCE, however this did not impact on students overall performance.²⁶ Suggesting that anxiety is not the only factor impacting student performance in the OSCE.

Poor time management and anxiety are commonly cited reasons for students struggling on placement and requiring additional time.²² Dietetic students use timed sessions to

develop confidence in information retrieval, attainment and performance ability prior to sitting the OSCE.²⁷ This may help to improve students' perception of control and in combination with techniques to reduce student anxiety, may help to improve performance long term.²⁸ In addition, OSCE briefings allow students to become familiar with the process. These measures may have contributed to the downward trend in students reported stress levels with the dietetic OSCE examination over the last three years.

Providing feedback after an OSCE affects the affective domain of learning and improves students' ability to relate OSCE activities to clinical practice.² Video/audio recording also provides a valuable method to further support students in reflecting on skill use in preparation for the OSCE and future placement.²⁹ Currently we offer dietetic students audio/video recording as an optional method of support when developing skill use, with audio- recording routinely used for some skill development sessions. Routine use of simulation strengthens links between theory and practice, as well as developing confidence³⁰ and self-efficacy³¹ in use of communication skills. Practical sessions also help support knowledge acquisition,³² in preparation for the OSCE, setting theory exam close to the OSCE helps strengthen this area further.

A retrospective review of data does carry some limitations as it is unable to relate individual feedback to student performance or explore variations in placement performance and skills utilised with student perceptions. However, despite these drawbacks and the minor changes that have occurred to the OSCE over the last eleven years a consistent pattern has emerged. The data presented indicates that the OSCE

provides a successful assessment of dietetic students' practical skills required for placement. The OSCE has a valid role in preparing dietetic students for placement and identifying students likely to struggle and therefore require additional support.

In summary, this retrospective review highlights an association between the aggregate OSCE mark, in particular mean active station marks and dietetic students who are likely to fail placement. The OSCE provides a meaningful assessment of practical clinical skills, and is a useful indicator of dietetic students' performance in practice, indicating students who are likely to require additional support on placement.

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Table 4: Aggregate marks achieved in OSCE and placement outcome

N=328	Passed Placement n= 280	Struggled on placement n=22	Failed placement n=26
Mean OSCE mark (SD)	63.24 (7.94)	58.25 (8.82) *	57.19 (8.28)**

* Independent t-test indicates significant difference between students who passed placement and those who struggled on placement, $p = 0.005$

** independent t-test indicates significant difference between students who passed placement and those who failed placement, $p < 0.001$

Table 5: Aggregate OSCE mark for Post-Placement and Pre -placement compared to placement outcome

N=328	Passed placement	Struggled on placement	Failed placement	<i>P</i> value
Post-placement OSCE mean (SD)	62.71(7.80)	54.82 (5.51) *	55.07 (5.84)**	0.001
n=138	n= 116	n=10	n=12	
Pre-placement OSCE mean (SD)	63.61(8.12)	61.10 (10.21)	59.00 (9.77)**	0.101
n=190	n= 164	n=12	n=14	

*Independent t-test indicates significant difference between students who passed placement and students who struggled $p = 0.002$ ** Independent t-test indicates significant difference between students who passed placement and those who failed placement; post-placement $p = 0.001$, pre-placement $p = 0.047$

Table 6: Mean active station marks and placement outcome

Mean Active station marks	Passed placement	Struggled on placement	Failed placement	P value
Overall mean active stations (SD)	66.72 (10.04)	61.50 (13.49)	56.00 (11.74)**	0.001
N=255	n = 220	n = 16	n = 19	
Post-placement OSCE Active stations (SD)	67.14 (9.13)	54.38 (7.47)*	52.90 (8.39)**	0.001
n= 65	n = 56	n= 4	n = 5	
Pre-Placement OSCE Active stations (SD)	66.58 (10.36)	63.88 (14.43)	57.11 (12.82)**	0.007
n= 190	n =164	n= 12	n=14	

*Independent t-test indicates significant difference in active station marks achieved in students who passed placement and students who struggled, $p = 0.008$. ** Independent t-test indicates significant difference in active station marks between students who passed placement and those who failed; overall $p = <0.001$, post- placement $p = 0.001$ pre-placement $p = 0.002$

Table 4: Mean passive station marks and placement outcome

Mean Passive Station marks	Passed placement	Struggled on placement	Failed placement	P value
Overall passive station mean (SD)	61.30 (9.26)	59.18(9.26)	*57.41(9.31)	.050
N =325	n=280	n=22	n=26	
Post-placement OSCE Passive stations (SD)	62.56(8.39)	57.60(9.41)	**54.69 (6.89)	.003
n = 65	n=116	n=10	n=12	
Pre-Placement OSCE Passive stations (SD)	60.41(9.76)	58.50 (9.71)	59.75(10.67)	.795
n= 190	n=164	n=12	n=14	

* Independent t-test indicates significant difference in overall passive station marks between students who passed placement and those who failed, $p = 0.042$ **Independent t-test indicates significant difference in post- placement passive station marks between students who passed placement and students who failed placement, $p= 0.003$

Table 5: Student evaluation of the OSCE examination

N=312	Percentage of students who agree that the OSCE				
	Is a meaningful assessment of skills	Is a fair assessment of skills	Helps to prepare students for practice	Is perceived to be stressful	Will help students manage stressful events
OSCE Post-placement 2006/7 to 2009//10 (n=140)	63% (93/140)	73% (104/140)	35% (54/140)	83% (116/140)	40% (56/140)
OSCE Pre-placement 2010/11 to 2016/17 (n=172)	92% (160/172)	92% (158/172)	82% (141/172)	89% (155/172)	81% (140/172)